TITLE: EFFICIENT PCM MODEM

ABSTRACT OF THE DISCLOSURE

Apparatus and devices used to achieve a computationally efficient modem having a transmit path and a receive path. The apparatuses include a Farrow phase shifter for shifting the phase of signals in the transmit path, a fractionally spaced equalizer capable of equalization and signal decimation in the receive path, a primary echo sub-canceler and a post equalizer echo canceler for canceling echoes on the receive path, and a phase locked loop and add/delete register for controlling the sampling rate of a CODEC. The method includes shifting the phase of a transmit signal using a Farrow structure, equalizing and decimating a receive signal with a fractionally spaced equalizer, canceling primary echoes on the receive signal using a sub-canceler structure and canceling remaining echoes using a post equalizer echo canceler, and adjusting the sampling rate of a CODEC using a phase locked loop and an add/delete register.

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